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ABSTRACT

This paper examines whether the existence of national education goals implies a new federal role in school finance. Disparities across the 50 states in terms of fiscal capacity and tax effort, education spending, and several measures of educational outcomes are analyzed. The next section summarizes a study of variables that predict states with high and low scores on student mathematics achievement. Findings indicate that substantial differences in fiscal capacity, educational spending, and student outcomes existed across the 50 states. These differences make it difficult for all states to meet the national education goals by the year 2000. A new federal role to reduce interstate disparities would be to implement some kind of nationwide base education spending, adjusted by state and regional cost of educational differences, and to fully fund categorical programs. Twelve figures are included. (LMI)

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National Goals and Interstate Disparities: A New Federal Role in School Finance

ALLAN ODDEN
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Working Paper Number 8
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NATIONAL GOALS AND INTERSTATE DISPARITIES: A NEW FEDERAL ROLE IN SCHOOL FINANCE

by

Allan Odden and Lori Kim

The federal role in education policy and school finance has always been small. In 1990, the federal government provided just 6 percent of public school revenues (Odden, Chapter 1). Most federal dollars traditionally have supported modest research and data gathering activities; programs for low achieving poor students, handicapped students, limited English proficient students, and students in vocational education programs; and a variety of offices that helped to prohibit discrimination. The federal role was considered ancillary to that of the states which defined curriculum and instruction, certified teachers, accredited schools, funded district operations and governed the overall public education system. There were no national education goals. A common school curriculum was viewed as violating local control. National testing of individual students was simply something done by other countries -- but not the United States.

When President Bush and the 50 state governors met for an education summit in the fall of 1989, these traditions were broken and a new era was inaugurated. Today the country has national education goals (The White House, 1990), there is widespread talk of a national curriculum (Smith, O'Day & Cohen, 1990) and work is proceeding to develop a national student testing system (Resnick & Tucker, 1991). Further, the governors have issued a blueprint for how states can accomplish the national education goals (National Governors Association, 1990) and the president and governors created a National Education Goals Panel which is deciding how to measure progress towards the goals (National Education Goals Panel, 1991), even though movement to implement the goals has been slow.

This chapter raises the issue of whether the existence of national education goals implies a new federal role in school finance. It first assesses in greater detail general implications of nationwide education goals for a country that currently has 50 different education systems. It then analyzes disparities across states in terms of fiscal capacity and effort, education spending and several measures of educational outcomes. The next section summarizes a study of variables that predict states with high and low scores for student mathematics achievement. The last section identifies new federal roles that logically follow from national education goals and disparities across the states, including a federal role in providing general education aid.

NATIONAL GOALS AND CURRENT STATE EDUCATION POLICY

After the historic October 1989 education summit, the President and the nation's governors met again in early 1990 and formally adopted a set of national education goals (The White House, 1990) which are that by the year 2000:

1. All children in America will start school ready to learn.

2. The high school graduation rate will increase to at least 90 percent.

3. American students will leave grades four, eight and twelve having demonstrated competency in challenging subject matter including English, mathematics, science, history, and geography; and every school in America will ensure that all students learn

to use their minds well, so they may be prepared for responsible citizenship, further learning, and productive employment in our modern economy.

4. United States students will be first in the world in science and mathematics achievement.

5. Every adult in America will be literate and will posses the knowledge and skills necessary to compete in a global economy and exercise the rights and responsibilities of citizenship.

6. Every school in America will be free of drugs and violence and will offer a disciplines environment conducive to learning.

The President and governors developed these goals for all students, not just the best and the brightest. All students need to start school ready to learn, and all student need to show proficiency in the core areas of mathematics, science, writing, language arts, history and geography. "All of our people, not just a few, must be able to think for a living, adapt to changing environments, and to understand the world around them" (The White House, 1990: 1). Never before in the history of the country have such education goals been set for everyone.

Moreover, the goals are bold and ambitious. They are education goals that are far beyond what is accomplished in America's schools today. The Nation's Report Card (Mullis, Owen & Phillips, 1990) shows that only 5-7 percent of today's student show a proficiency in these subject areas that is sufficient for doing regular college study, while the percentage is much higher in other countries, especially Germany and Japan. Even the performance of our top students is below that of many other countries (Policy Information Center, 1991). Thus, not only are the goals a "stretch" for the country's top students, but also they constitute a major leap for students in the middle and at the bottom.

Finally, it is hoped that all states will adopt these national goals as state goals as well, and possibly even set a broader set of education goals. States could add proficiency in the arts, music and physical fitness. States could explicitly add competency in thinking, problem solving, communication and working in collegial groups, all skills increasingly needed in the workforce (Commission on the Skills of the American Workforce, 1990). Thus, while the nation's education goals entail difficult to achieve outcomes for what students know and can do, and progress towards the goals will be measured and reported to the nation annually, state goals are likely to be even more ambitious.

Today, however, states are at very different places with respect to these education goals. Poverty is a good indicator of the degree to which students, at the age of five, are able to come to school ready to learn. On average from 1983 to 1987, about 21 percent of children lived in a home with an income below the poverty level (Children's Defense Fund, 1989). This figure is higher than it was ten years ago and continues to grow. States varied greatly about the average. In Mississippi, 34.3 percent of students lived in poverty, while in New Hampshire, only 6.2 percent of children lived in poverty. The high poverty states have a bigger challenge in producing students at the age of five who are ready to learn. Goal one, in short, impacts states very differently, with the toughest challenges in the states with the highest poverty rates and, it turns out, lowest ability to raise funds to address poverty.

Likewise, the high school graduation rate varied dramatically across the states according to the U.S. Department of Education's 1990 Wall Chart. While the nationwide average figure was 71.2 percent in 1989, it ranged from a low of 58.0 percent in Florida to a high of 90.2 percent in Minnesota. The differences are quite dramatic. States with the highest graduation rates appear to be graduating 50 percent more of their students from high school than do states with the lowest graduation rates. In other words, goal two poses a much greater education challenge for some states than for others.

Similarly, with the June 1991 release of the first valid student outcome data on a state-by-state basis, the nation discovered that student achievement also was different across the states (Mullis, Dossey, Owen & Phillips, 1991). While results are provided only for eighth grade mathematics achievement, they are ominous and suggest that accomplishing the nation's goals on a state-by-state basis will be difficult. No state had a large number of students showing proficiency in mathematics. The results showed that what eighth grade students know and can do in mathematics is far below what the nation desires. And like the above data, student achievement differed from state to state.

In short, there is variation in current state position with respect to all six of the nation's education goals. Although federal and state education and political leaders have stated that the nation should not compare states as the country moves towards accomplishing the national goals, the differences across the states hardly can be ignored. No state governor could (or should) easily set his or her state's education goals below that of the nation. The fact is that state's farther behind on any goal simply have a greater distance to travel because there will be pressure on all states to meet the nation's education goals by the year 2000.

In order to make substantial progress towards meeting the goals, all states will need to create and implement a comprehensive and cohesive set of education reforms. At the state level, the "systemic reforms" needed will include a unifying education vision with explicit goals stated in measurable student achievement terms, curriculum frameworks linked to those goals, substantial professional staff development, new forms of accountability assessment to measure current status and progress over time in attaining the goals, revised instructional materials and restructured educational governance (Smith & O'Day, 1991).

These general strategies will need to be formulated into cohesive school programs at each local site. Examples of such comprehensive programs include, for example, Success for All Schools (Madden, Slavin, Karweit, Dolan & Wasik, 1991) and Accelerated Schools (Levin, 1988) at the elementary level, restructured middle schools such as those envisioned in Turning Points (Carnegie Task Force, 1989), and changes in high school organization and programs (see Sizer, 1990, for example). Not all of these programs cost substantially more than is spent today (Marsh & Sevilla, Chapter 3). But the Success for All School, which has been called the "cadillac" of new school programs and produces large increases in student performance, is costly (Madden et al., 1991). To fund it would require fully financing the federal Chapter I program and adding an extra $1000 per pupil (Madden, et al., 1991).

Indeed, the types of programs and services needed to bring *all* students to proficiency levels on national student achievement goals will likely take substantial new resources. Further, such programs will require highly skilled teachers with the level of knowledge and skills outlined by the National Board for Professional Teaching Standards (1991), but this level of professional expertise seems to be in short supply (Cohen, 1991). While the nation has been putting significant new funds into the schools each decade (Odden, Chapter 1), there have been wide difference across regions and states in school funding changes (Odden, 1990). In low funding increase states, putting these expensive new programs in place to meet national and state education goals will be difficult.

The fact is that states differ widely in fiscal capacity and effort -- the ability to raise funds for school (or any governmentally provided services). As a consequence, educational revenues per pupil are quite different from state to state. More importantly, as will be shown below, the states with the farthest to go in accomplishing the nation's education goals are now spending at the lowest levels and generally have the least fiscal capacity from which to raise more money in order to increase education spending. These differences among the states, which are discussed at more length in the next sections, form a major obstacle to accomplishing the country's education aspirations. Remedying these differences could very likely imply a new federal role in school fiance, beyond just fully

funding current programs for special needs students, such as Head Start, Chapter I and programs for the handicapped.

INTERSTATE FISCAL AND EDUCATIONAL OUTCOME DISPARITIES

About 13.3 percent of total government expenditures were spent on education in 1988 (Advisory Commission on Intergovernmental Relations [ACIR], 1990). Education is the third largest governmental (federal, state, and local) spending function, preceded only by national defense/international relations and social security/medicare. But, the federal government by itself allocated only 1.6 percent of its expenditures to education whereas state and local governments allocated 29 percent of their expenditures to education. Further, states and local governments allocated an even larger portion (35 percent) of direct general expenditures for education. General expenditures include all government expenditures other than the specifically enumerated expenditure classified as Liquor Store Expenditures, Insurance Trust Expenditures, and Utility Expenditures. It includes state and local government expenditures for education services, social services and income maintenance, transportation, public safety, environment and housing, governmental administration, interest on general debt, and other general expenditures.

A policy question for national goals, of any sort, but especially those that must be accomplished through each of the 50 states, is the degree to which states have relatively equal fiscal capacity and dollars for education from which to mount programs to meet the goals. The fact is that, *within* most states, the ability to raise funds for educational purposes varies considerably across local districts and, in part as a result, per pupil spending, and resultant programs, services and student achievement also differ, sometimes dramatically. Further, there is a pattern to the within state differences: districts high in property wealth per child (the local tax base) usually enjoy higher spending and better quality programs than districts low in property wealth, which usually have below average spending per pupil even with above average tax rates. The policy question for national goals is whether these within state fiscal disparities are mirrored by cross-state disparities too.

For the past twenty years, states have been vigorously addressing their within state disparities. Indeed, state school finance structures that make the level of spending a function of local property wealth have been the subject of court litigation based on both state equal protection and education clauses (Odden & Picus, 1991, Chapter 2). By the end of 1990, courts had overturned about 15 state school finance structures, but the number is likely to rise in the 1990s since there were active cases in nearly half the states by mid-1991. Both in response to a court decision overturning a school finance system, as well as part of an 80 year tradition to reduce school finance fiscal disparities, states became more active in funding school finance, raising the state role from 40 percent in 1970, just before the modern era of school finance, to 49 percent in 1990, while reducing the local role from 52 percent in 1970 to 45 percent in 1990. Indeed, only the state could intervene and redress the fiscal differences across local districts.

While the early legal challenges to within state school finance inequities were taken to the U.S. Supreme court, it ruled that such disparities did not violate the Equal Protection Clause of the 14th Amendment to the United States Constitution. There has been no court case challenging inter-state school finance disparities, although as the next section shows, they exist in about the same magnitude as many within state disparities. Such disparities could be addressed by the federal government in the 1990s.

A renewed federal interest in school finance inequities emerged during the 1990 Congressional session. A bill was introduced that would have conditioned receipt of federal education aid on the degree of within state inequality in per pupil spending across districts. That was not the first time the issue of school finance fiscal disparities was debated in Congress, and the issue of a federal role in general school finance raised. In the 1970s, after the initial rash of school finance court cases, a federal role of general aid was

proposed. The Congress responded by enacting a program for states to conduct research studies of within state school finance equalization. A federal role in general school finance was then an idea whose time had not yet arrived.

In the 1960s, the National Education Association proposed that education funding be split among the three levels of government: 1/3 local, 1/3 state and 1/3 federal. But this idea, too, was ahead of its time.

National education goals, thus, raise the issue of a federal role in a brand new light. If indeed, school finance fiscal disparities, similar to those within states, exist across the states and especially if the disparities are related to student performance, the federal government is the only level of government that can intervene to remedy them. This section explores the degree to which such disparities exist and their linkage to outcomes.

Although no two states in America have the same education or taxing system, indicators of interstate fiscal and education disparities are discussed below using six general variables: personal income per capita, tax effort as reflected by the ACIR representative tax system (RTS), expenditures per average daily attendance, percent of population completing high school by age 25, and percent of high school graduating seniors taking the scholastic aptitude test (SAT). The newly acquired data on eighth-grade mathematics scores are included for 37 states that chose to participate in the 1990 National Assessment of Educational Progress (NAEP) trial state assessment (Mullis, Dossey, Owen & Phillips, 1991).

State average personal income per capita roughly indicates state tax capacity, i.e., the relative ability of states to raise tax revenues. There are many potential measures of tax capacity, including the property, sales and income tax base, the ACIR's representative tax base, gross state product, and total taxable resources. But, per capita income is highly correlated with all of them, is relatively understood among the public and is used in many intergovernmental aid programs as an indicator of tax capacity. The measure used is for 1988.

The willingness to raise revenues in a state is represented by the 1988 ACIR index of tax effort relative to its representative tax capacity. The relative tax effort is determined by taking each state's tax revenues, and expressing them as a rate applied to the state's ACIR relative tax capacity measure. The result is then standardized to an index by dividing each state's tax effort by the average for all states. The index for the United States average is 100.

Expenditures per pupil is used as the indicator of for how much each state spends on public education for current operating purposes. The figure used was an estimated figure provided by the National Education Association for the 1989-90 school year.

Since there are no comprehensive education achievement indicators that have been developed for interstate comparison, three single indicators were selected: percentage of population completing high school by age 25, percentage of high school seniors taking the SAT examination, and (for 37 states) the average score of eighth graders on the 1990 NAEP mathematics test.

Determining the high school graduation rate is complicated. There is a big difference between a measure that indicates the proportion of a ninth grade cohort that graduates from high school four years later, and the proportion of the population that earns a high school diploma by the age of 25. The analysis uses the latter measure which is the measure more closely related to national education goal number two. However, the most recent state level data available for determining percent of population completing high school by age 25 derives from the 1980 census. High transient rates during last decade and other economic and social factors might present different pictures for the 1990 census, but these more recent data are not yet available. The following uses the 1980 data.

The analysis uses the percent of high school graduating seniors taking the SAT examination simply because the SAT is a figure often used in public debates about education. The measure probably says more about the nature of college admissions in a state than about student achievement. The SAT is not a valid indicator of student

achievement. However, percent taking the SAT at least shows the different status of the states in the percentage of college-bound high school seniors take that test.

In June 1991, the first, valid comparison of student achievement across the states was made public (Mullis, et al., 1991). For 37 states, NAEP provides information on eighth-grade student mathematics achievement. This figure is the most direct indicator of student achievement in the following analysis, even though it is limited to one subject at one grade level.

Figure 1 shows the actual data for the six variables mentioned above for all fifty states. Figure 2 provides descriptive statistics for these variables, such as maximum, minimum, mean, standard deviation, and coefficient of variation, all of which indicate the degree to which the variables are different across the states.

Figures 1 and 2 about here.

A brief glance of the figures indicates wide differences across states for all variables. Personal income per capita in 1988 varied widely; the average for the United States was $15,719. But the range of $11,943 between the lowest state, Mississippi, and the highest state, Connecticut was almost as large as the average itself. Personal income per capita in Connecticut ($23,059) was more than twice of that in Mississippi ($11,116). The coefficient of variation, 0.19, also indicates a wide variation in per capita income. Two-thirds of the states have a per capita income from 19 percent below to 19 percent above the mean, that is between $12,732 and $18,705.

All tax revenues are derived from personal income; families spend what money they have left after paying taxes. As a fiscal capacity indicator for education, the per capita income measure suggests that Connecticut has more than twice the ability to support education than Mississippi. In short, the ability of states to raise revenues for education (or other governmental activities) is quite different from state-to-state.

There also is a wide gap among the 50 states in tax effort, even though the variation is smaller than that of fiscal capacity. Using the ACIR index of tax effort, about two-thirds of the states (33 states) scored below the average while the other third (17 states) scored above the average. This skewed distribution is a result of New York's extremely high index. The tax effort index for New York, the highest tax effort state (Index =157), is about 2.5 times as high as that of New Hampshire, the lowest tax effort state (Index = 66). High effort in a high fiscal capacity state, such as New York, can produce large revenues, but high effort in a low fiscal capacity state, such as Utah, usually produces below average revenues. The striking feature of Figure 1 is that higher effort seems to be associated with higher fiscal capacity.

Educational expenditures per average daily attendance among the 50 states is shown in column 4 of Figure 1 and it too exhibits variation across the states. The national average expenditures per pupil in 1989-90 was $4,824, about at the 58th percentile. The data indicate that the highest spending state -- New Jersey -- spent $8,439 per student which is more than three times that of the lowest spending state -- Utah which spent just $2,733. These differences would not be eliminated even if the expenditures were adjusted for the cost of living differences across the states.

The coefficient of variation indicates that two-thirds of the states spend within 30 percent of the mean. This indicates that disparity among states within the range of just one standard deviation of the mean is still high; the difference in spending between the highest and the lowest spending states within this restricted band is still about $2,800 per pupil. Compared to the average of $4,824, this difference should be a matter of both analytic and policy interest especially now that all states are striving to raise the level of educational achievement to meet national achievement goals.

While these measures suggest that there are wide differences in state fiscal capacity, tax effort and educational spending, the first outcome measure -- the percent of the population completing high school by age 25 -- indicates that differences among states,

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while less than for the fiscal variables, were also quite large. In 1980, the average percent of the population that earned a high school diploma by age 25 in the United States was 67.8 percent. Alaska had the highest percent of high school graduates by age 25 (82.5 percent) whereas Kentucky had the lowest (53.1 percent). The coefficient of variation indicates that two-thirds of the states had 60 to 76 percent of the population completing a high school education by age 25.

As expected, the percent of high school seniors taking SAT (the second outcome variable) varied greatly among 50 states, ranging from 4 percent in Mississippi to 74 percent in Connecticut. On the average, 24 percent of the high school graduating seniors in the United States took the SAT in 1990. Variation among the states is so great that in a range of just one st...dard deviation above and below the mean, i.e., two-thirds of the states, the range extends from 10 percent to almost 60 percent.

NAEP eighth-grade mathematics scores, the most direct student outcome measure, exhibit the least variation among the 37 states that participated. The average score of all 37 states was 264 out of the highest possible score of 500. On the average, these eighth-grade students answered 53 percent of the questions correctly. North Dakota scored the highest with a score of 281 (56 percent correct) while Louisiana had the lowest score of 246 (49 percent correct). Between the highest and the lowest scores, the difference in correct responses is only 35 points or 7 percent. This small variation is also indicated by the small value of the coefficient of variation, 0.04. Two-thirds of the 37 states scored within 10 points either above or below the mean. Nevertheless, very few states had an average score at a high level of mathematics proficiency (Mullis, et al., 1991).

While variation across the states for these data are not unexpected, the more interesting analytic and policy questions are whether there are relationships among these data. Figure 3 presents these data sorted by personal income per capita and grouped into deciles with about equal numbers of students. Several findings are suggested by the figures in this chart. Column 3 shows that per capita increased by about $1000 across each decile. The increase is expected because that is how the data are sorted; the size of the increase is large, with the top decile having almost twice the per capita income of the bottom decile. Column 4 indicates that there is no clear pattern for tax effort, although the effort of the top five deciles seems to be a bit higher than the effort of the bottom five deciles.

Figure 3 about here.

Column 5 shows that educational expenditures per pupil increase over each decile, except for the eighth decile which is represented by California alone. The data show quite clearly -- and somewhat surprisingly -- that states with higher personal income per capita spend more money per pupil on education than do states with lower per capita income. California is the major exception to this rule. It used to spend at a high level (Picus, 1991) and its lower spending in 1990 is largely explained by its twin tax and spending limitation measures -- Proposition 13 which limits raising local property tax revenues and the Gann limit which restricts spending state revenues (Guthrie, Kirst & Odden, 1991).

Figure 4 about here.

Just as is the case within most states (Odden & Picus, 1992), educational spending is linked to fiscal capacity -- the higher the state's per capita income, the higher its current operating educational expenditures per pupil. Indeed, as shown in Figure 4, the correlation between per capita income and expenditures per pupil is 0.83, which is quite high and higher than the correlation between spending and local district fiscal capacity within most states. In short, the within state fiscal inequities that have dominated school finance policy and research for this century are mirrored even more strongly by disparities across the fifty

states. In an era of national education goals, these differences might impede rather than foster attainment of those goals.

More sophisticated regression analysis also supports the above conclusions, as indicated by the results in Figure 5. The model analyzed postulated that educational expenditures were a linear function of: 1) fiscal capacity (per capita income), 2) tax effort, 3) educational need (percent poverty, percent minority and percent handicapped), 4) price, and 5) taste (percent parents who are college graduates). The model explained 86 percent of the variation in educational spending across the states. The statistically significant variables were: fiscal capacity, tax effort, percent handicapped and price. Except for a portion of state tax effort, differences across the states in these variables are subject only to intervention by a higher level of government.

Although the pattern is less consistent, Figure 3 also shows that the percent of the population that earns a high school diploma by the age of 25 also tends to increase with state personal income per capita. The percent is in the low sixties for the first two deciles, rises to about 70 percent for the middle deciles, and is above 70 percent for deciles nine and ten. As shown in Figure 4, the correlation between completing a high school education and per capita income is a positive 0.36, statistically significant but at a modest level.

A stronger relationship is shown between state per capita income and the percent of high school seniors taking the SAT examination. With the exception of the forth decile, the percentage increases consistently over each decile of income. The correlation coefficient for the relationship between these two variables is 0.70, a strong positive relationship.

States with higher personal income per capita appear to have greater portions of high school seniors taking SAT. This indicates that high-income families tend to reside in the states where a greater portion of high school seniors intend to attend colleges that require the SAT for admission. While this requirement is not a quality indicator in and of itself, most of the country's prestigious colleges and universities require an SAT score.

While only those 37 states who participated in the NAEP eighth-grade mathematics examination were compared, personal income per capita was found to be only slightly related with mathematics achievement (see Figure 6), with the correlation coefficient at 0.12 (Figure 4). Because the NAEP scores show little variation across the 37 states, it is difficult statistically to have correlations with other variables that do vary, such as personal income per capita. Although the result shows that eighth-grade students in some states with high income per capita seem to know more mathematics than some students in states with low income per capita, the pattern is inconsistent. Several states in the upper Midwest, with below average per capita income but relatively homogeneous populations, have students who scored quite well on the mathematics test. California, on the other hand, had high per capita income but a diverse population, and scored in the bottom third.

Figure 6 about here.

Student achievement and family income generally seem to be related, but other variables such as spending level, types of programs and services and diversity of the student population also play a role. The modest, though inconsistent relationship between these state-level data suggest that state education systems have not, to date, been able to overcome the disadvantages of low family income, or poverty (which is strongly negatively correlated with per capita income). The relationship between state fiscal capacity and achievement also suggests that the states that need to make the largest student achievement improvements, have the lowest incomes to tap for revenues to finance new education initiatives.

In short, personal income per capita is strongly related to both expenditures per pupil and the percent of high school seniors taking SAT, and moderately related to the percent of population completing high school by age 25 and eighth grade student achievement in mathematics. These findings make it difficult for all states to achieve the nation's education goals and suggest that the federal government might need to intervene;

only a level of government above the states can adjust for differences in state fiscal capacity that in turn affects education spending and student achievement.

To undergird these points, Figure 7 exhibits the correlation coefficient between expenditures per pupil, state fiscal capacity and effort, and student outcomes. The high correlation with personal income per capita was discussed above. The correlation between tax effort and expenditures per pupil is also high -- 0.46 -- higher than the correlation with personal income per capita (0.19). States with higher tax efforts seem to have higher educational expenditures per pupil even though the relationship is moderate. The correlation between expenditures per pupil and the percent of population completing high school by age 25 again is positive, but just 0.27, while the correlation between expenditures and the percent of high school graduating seniors taking the SAT examination is higher at 0.68.

Figure 7 about here.

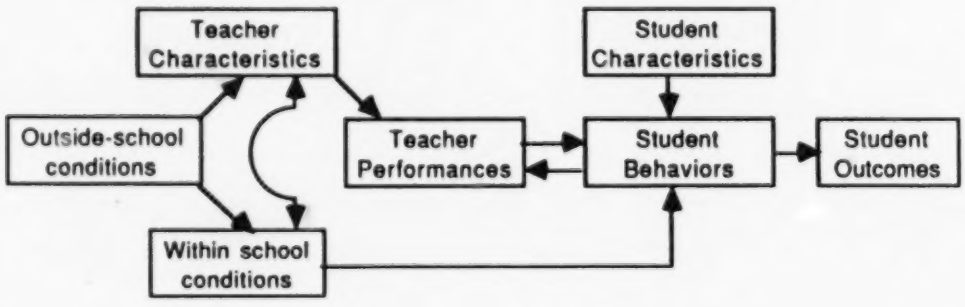
Finally, states spending more on education appear also to produce somewhat better eighth grade mathematics achievement, with the correlation at 0.18. In other words, the higher the states per capita income and the higher its tax effort, the higher its per pupil education spending and the greater the number of students earning a high school diploma, the greater the percentage of students who take the SAT and the higher the mathematics achievement. In short, higher fiscal capacity leads to higher education spending which seems to produce higher student outcomes. Likewise, lower fiscal capacity seems to produce lower education spending, and unfortunately for national education goals, lower student outcomes. Again, only a higher level of government can intervene and reduce these cross-state differences. If all students are to achieve the nation's bold education goals, the links among personal income per capita, education spending and achievement must be broken.

DIFERENCES BETWEEN HIGH AND LOW SCORING STATES

While the variation in 8th grade NAEP scores for the middle group of the 37 states was quite small, the differences between the top 12 and bottom 12 states were more dramatic. Using a structural model proposed by Centra and Potter (1980) that identified groups of variables that influence student achievement (Figure 8), a discriminant function analysis was conducted for the top 12 and bottom 12 scoring states. The model contains

Figure 8

Structural Model of Variables Influencing Student Learning Outcomes in the Centra and Potter Model



six factors that influence student learning outcomes including: 1) outside-school conditions; 2) within-school conditions; 3) teacher characteristics; 4) teacher performances; 5) student characteristics; and 6) student behaviors. Outside-school conditions could include school size, fiscal resources, urbanism, and racial composition; within-school conditions could include the reward system, instructional organization (e.g., tracking), enacted curriculum, student peer group influences, and quantity of schooling. Teacher characteristics include such variables as teaching experience, knowledge of subjects and of teaching, values and attitudes, and social class. Teacher performances could be such variables as reinforcement, questioning technique, time on task and instructional strategies. The model does not specify variables for student behaviors except that they are classroom behaviors interacting with teachers. Finally, student characteristics are measured by social class, race, parental influence, aptitudes and prior learning, values and attitudes, and learning styles.

Drawing upon the data base in the NAEP state-by-state report, ten variables were chosen for the discriminant analysis:

Factor 1 -- outside school conditions:

- current operating expenditures per pupil in 1987-88
- percent of students living in a disadvantaged urban community;

Factor 2 -- within school conditions:

- percent of students whose teachers' placed heavy instructional emphasis on numbers and operation, i.e., basic skills, as a measure of the enacted curriculum;

Factor 3 -- teacher characteristics:

- percent of students whose teachers had more than 10 years of teaching experience
- percent of students whose teachers had taken four or more math courses;

Factor 4 -- teacher performance:

- percent of students whose teachers had mathematics instructional time that equaled or exceeded four hours per week
- percent of students whose teachers had students work in small groups one or more times per week
- percent of students whose teachers had students take class tests more than once per week;

Factor 5 -- student behavior

- percent of students who read more than five pages a day for school work and homework (all subjects);

Factor 6 -- student characteristics

- percent of students whose parents did not graduate from high school.

Multivariate analysis of variance showed that the two groups of states were significantly different on these ten variables combined (Kim, 1991).

As a follow-up analysis, a discriminant analysis was employed to identify the variables on which high- and low-scoring states differed the most, and how well these variables could be used to distinguish these two groups of states. The result again confirmed that the two groups of high-performing and low-performing states, overall, were significantly different in the independent variables combined (see Kim, 1991).

Next, the contributions of the individual variables to differentiating high from low scoring states was determined and the weights of the variables were evaluated to assess how important each variable was in discrimination. Figure 9 also summarizes the results of univariate tests for each independent variable. The results show that means of the two groups were significantly different on all variables except the percent of students whose teachers have taken four or more mathematics courses. The other nine variables, therefore, made significant contributions to distinguishing the high- from the low-performing states.

Figure 9 about here.

In order to determine the degrees of importance of the nine significant variables in discriminating among the two groups of states, the score of the discriminant variable (composite synthetic variable) was analyzed. This step determined how much contribution to the score was made by each individual variable. The discriminant function was found to be statistically significant (Kim, 1991), meaning that there were significant differences between the group means in the predictors combined. The canonical correlation, R_c, a measure of the degree of association between the discriminant score and the groups, was 0.933, indicating that the percentage of variance accounted for by the function was 0.933^2 or 87 percent.

In order to determine the importance of individual variables, both standardized coefficients and structural coefficients can be used. Standardized coefficients in discriminant function analysis can be interpreted in a manner analogous to beta coefficients in multiple regression analysis; the relative magnitudes of the standardized coefficients can be used to indicate the relative contribution of the predictor variables to the discrimination between the groups. Structure coefficients are correlations between discriminant scores (that are computed from the discriminant function) and each of the original variables. But, standardized coefficients are unstable when variables are correlated. Since some of the predictor variables were correlated in this study, structure coefficients were used instead. The square of a structure coefficient indicates that proportion of variance that is accounted for by the given discriminant function.

The structure matrix (Figure 10) shows the proportions of variance that are associated with the ten independent variables. The results indicate that percent of students with parents who did not finish high school appears to make the largest contribution. Testing frequency, high emphasis on numbers and operations (basic skills) and urban disadvantage all, interestingly, negatively contribute to student achievement. By contrast, student reading, teacher experience and expenditures per pupil positively contribute to achievement.

Figure 10 about here

Kim (1991) also used the results of the discriminant analysis to classify states into high- and low-scoring categories. Membership of all 12 states in the high-performing group and of all 12 states in the low-performing group was predicted correctly. The overall percentage of cases classified correctly by the discriminant analysis, or the overall hit rate,

was 100 percent, indicating that the ten predictor variables were robustly able to identify states that scored high or low on the NAEP 8th grade mathematics achievement test.

In short, the ten variables used in the discriminant analysis were strongly able to distinguish high from low scoring states on the mathematics performance of eighth-grade students. All but one of the ten variables were found to be statistically significantly different between high- and low-performing states. Low-performing states tend to have greater percentage of students whose parents did not finish high school than high-performing states. They appear to have a greater portion of students taking tests at least once a week. Regarding curriculum exposure, they tend to have been exposed to very limited mathematics content as greater percentage of students had teachers placing heavy emphasis on basic skills, such as numbers and operations. They also seem to have greater percentage of students living in disadvantaged urban area. Finally, these states spent less per pupil for education. By contrast, students in higher performing states have greater percentages of parents who graduated from high school, take fewer tests, are exposed to a curriculum broader than basic skills, read more and attend school where spending per pupil is higher.

Kim (1991) also showed that instructional time was positively related to heavy teaching emphasis on numbers and operation (which is negatively related to achievement) and negatively related to heavy teaching emphases on geometry and algebra (which are positively linked to mathematics achievement). This finding suggests that when more instructional time is spent on teaching basic concepts and skills than on higher level of mathematics skills, the result is lower student performance on the NAEP mathematics assessment.

The above findings on factors related to differences in student achievement across states represent only the beginning results of what needs to be analyzed in more depth as additional data become available during the 1990s. Given the relatively small variation in inter-state scores, the number of significant relations found in the above analysis is surprising. Clearly, the curriculum is the major determinant of inter-state differences in student achievement in mathematics. While expenditures per pupil is a statistically significant variable in the analysis, its specific role in accounting for variations in achievement was small. How expenditures per pupil are related to curriculum quality and depth, as well as teacher ability to teach the curriculum, is a matter for future study. But expenditures per pupil differ substantially across states are caused by variations in fiscal capacity, tax effort, educational need and price.

Just as it required state intervention to reduce differences in education spending across local school districts that were caused by variations in the local tax base, so also it will require federal government or nationwide intervention to reduce differences in education spending across the states that are caused by variations in state fiscal capacity as measured by personal income per capita, and to reduce variations in student academic achievement, if the 1991 NAEP results are indicative of broader, across state student achievement differences. In addition, the federal government could implement categorical programs that also would help all states meet national education goals.

NATIONAL GOALS AND CURRICULUM

The results from the discriminant analysis reviewed above undergird the importance of creating a nationwide consensus on expectations for student achievement and, therefore, on the core curriculum that should be taught to all children. While there is controversy surrounding these recent initiatives, the analytic results suggested that a primary emphasis on basic skills is a detriment to student learning in mathematics. The reason is that a focus on numbers and operations fills the curriculum with arithmetic, with little attention given to probability, statistics, measurement, geometry and algebra. As a result, students tend not to learn many of these latter topics well, and score low on the type of mathematics assessment that NAEP now administers. Further, there is an emerging consensus that

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students should be appropriately proficient in these broader mathematics areas, since they reflect more the content of the national goals and they are materials mastered by eighth grade students from other countries.

The emerging professional consensus of what school curriculum should be in mathematics, science, language arts, and history social studies, as described in Chapter 1, over time hopefully will influence what is taught in classrooms and thus bolster student achievement in these content areas. Further, these movements now are professionally led and do not require a federal role or a new Congressionally enacted program. If there is agreement that this is the type of curriculum that should be taught in all public schools, any new type of national testing or assessment system should be highly linked to the substantive concepts and topics included in them. As the next section argues, moreover, there are also possibilities for new federal initiatives.

NEW FEDERAL ROLES IN EDUCATION FUNDING

Traditionally, educational efforts of the federal government have been devoted toward two major objectives, namely, enhancement of educational productivity and equalization of educational opportunity (Guthrie, Garms & Pierce, 1988). Figure 11 indicates that federal revenues were low until the the 1960s, when Chapter 1 (then Title I of the 1965 Elementary and Secondary Act) was begun, and then increased to a high point in 1980. During the 1980s, the federal fiscal role declined to 6.4 percent in 1990.

National goals potentially imply a new federal role in the regular education program to reduce the disparities in fiscal capacity, education spending and student outcomes shown by the previous sections. The preceeding analyses show that there are substantial differences in fiscal capacity and student achievement across the states. While some will

Figure 11

Percent Federal Revenues for the United States K-12 Public Education: 1919 to 1990, Selected Years

Year	Percent	Year	Percent
1920	0.3	1983	7.1
1930	0.4	1984	6.8
1940	1.8	1985	6.6
1950	2.9	1986	6.7
1960	4.4	1987	6.4
1970	8.0	1988	6.3
1980	9.8	1989	6.4
1982	7.4	1990	6.4

Source: National Center For Education Statistics (1991), Digest of Education Statistics 1990, U.S. Department of Education.; National Education Association, Estimates of School Statistics, 1990 and 1991.

argue those differences are significant enough to propose a new federal role to reduce them, others might argue that until the link between fiscal capacity and spending differences are more directly and strongly tied to differences in student achievement, a large and expensive

new federal role is unwarranted. Clearly, more analysis on the determinants of achievement differences across all schools in the nation are needed in order to unearth all the variables that contribute to achievement differences and thus potential policy interventions.

Nevertheless, the above analyses are suggestive of the need for a broader federal role in school finance. Perhaps the most costly federal intervention could be targeted directly on reducing differences in state fiscal capacity, such as a new federal role in general revenue sharing. While the design of such a program would be technically complex, the general idea would be for the federal government to insure a per capita tax yield across the states for similar tax efforts, similar to a within state guaranteed tax base program of school financing (Odden & Picus, 1992, Chapter 7). But the country had a general revenue sharing program during the 1970s and 1980s, it was recently eliminated by the Congress as part of a budget balancing program, and is unlikely to be resurrected. On the other hand, in 1991 there were emerging proposals for a new federal role in strengthening state tax revenue systems. Rivlin (1991) suggested a series of tax sharing strategies, including a uniform corporate income tax and replacing varying state sales tax rates with a uniform value added tax, with the proceeds shared with the states.

A more targeted, and less federal role could focus more narrowly on education. One could argue that national education goals suggests that there should be a nationwide base funding program across *all states* and local school districts. This base could be adjusted by state and regional cost of living differences to produce equal purchasing power. The level of the base would need to be sufficient to allow states, districts and schools to mount the types of programs and services that, on average, would produce student outcomes that would meet the national goals.

The current patchwork quilt of school financing across 50 states and 16,000 local districts is far from this conceptual target. In 1991, base education spending ranged from about $2000 per pupil in the lowest foundation program states to over $10,000 per pupil in the highest spending states, a difference of five to one, hardly a fiscal foundation that allows all states to meet the country's educational goals. While the distribution of current federal dollars helps modestly to offset these fiscal differences, a much larger role would be needed to produce a common per pupil fiscal base across the country. The bulk of federal aid is for the Chapter I program which is distributed inversely to poverty, and thus flows in larger amounts to states with high poverty and low per capita income. The amount of federal education aid, however, is not sufficient to impact dramatically differences either in state per capita income of education spending per pupil.

There are several ways such a federal role could be structured. One alternative would be for the federal government to bring base education spending up to some minimum level, such as the national average expenditures per pupil or the median expenditure per pupil level. If this were fully funded by the federal government, it would require a large boost in federal education revenues but would leave in tact current differences in state education tax effort.

A second alternative would be to make federal revenue for such a program contingent upon a state's exerting a minimum general tax effort, using measures such as an amount of own source tax revenues per capita, or a tax rate index at or above 100 on the ACIR tax effort index.

A third and more direct alternative would be for the federal government to implement a nationwide, district- or school-based foundation expenditure per pupil program. It would function just like a state foundation program (Odden & Picus, Chapter 7). First, the federal government would set a base spending level, or a foundation per pupil expenditure level for all districts or schools. The amount could be adjusted by a state-by-state cost of education index (see for example American Federation of Teachers, 1990). The federal government would make up the difference between this per pupil amount and an amount that would have to be raised by the state. The latter amount could be the yield from a statewide property tax, or it could be the yield from a statewide property tax and an

amount of state general fund revenues. Note that such a program would address both inter- and intra-state spending differences.

In order to implement such a program, there would need to be a policy decision on the proportion of the base that would be supported by federal funds and the proportion by state and local funds. A 20 percent federal, and 80 percent state and local role does not seem to be an unreasonable allocation. The specific proportion would be determined *analytically* by the size of the base spending figure and the yield from state and local tax rates, and *politically* by Congressional deliberation and federal government ability to increase education funding.

The bottom line fact, though, is that some type of nationwide base per pupil spending level is the logical school finance policy implication from the creation and implementation of national education goals, especially since spending differs across states and spending differences are correlated with a variety of student outcomes. While the particular design of such a new federal role in school finance could take many forms, it seems that a federal role in supporting the core education program is a policy whose time has arrived.

This policy suggestion would be consistent both with the current district and school attendance area approach taken by nearly all state education systems today, as well as with a system of public school choice, or a system of charter schools. As noted in Chapter 7, public school choice programs require the state to provide a base per pupil spending fiscal foundation for every school. A nationwide focus on this same policy, thus, is consistent with the type of state school finance system needed to undergird a school choice program. Further, such a federal programs is also supportive of states' allowing professionals to create charter schools, as Minnesota provided in a new 1991 law. In short, such a new federal role in school finance would make the current education structure fairer fiscally, and also would support systems that provided for student choice of public school.

AN EXPANDED FEDERAL ROLE IN CATEGORICAL PROGRAMS

Fully funding the current array of federal categorical programs is also consistent with the federal role in supporting state attainment of national education goals. First, Chapter 1 could be fully funded. Created in 1965, Chapter 1 is the federal program designed to improve the performance of low achieving students in schools with students from low income family backgrounds. And the new state NAEP eighth grade mathematics scores show that several of these states need to boost student achievement considerably. For the 1991 school year, Chapter 1 is funded at $6 billion which provides enough money to serve 60 percent of eligible students. Fully funding this program would require an additional $ 4 billion.

P.L. 94-142 is the federal program designed to help states provide adequate programs for physically and handicapped students. The law authorizes the federal government to support up to 40 percent of special education expenditures, but current funding of $ 2.6 billion supports only 13 percent of state special education costs. Increasing the federal role to its fully authorized level would require approximately an additional $ 5.4 billion.

Research shows that preschool and extended day kindergarten produce student learning gains and are highly cost effective (Barnett, 1985; Barnett, 1990). Even though only 27 states have enacted prekindergarten legislation, almost all states provide some type of early childhood education for either all or just at-risk children. Figure 12 shows that the number of children receiving pre-primary education increased dramatically over the last 35 years. In 1989, almost two thirds of three- and four-year-old children were enrolled in either public or private nursery programs compared to just a little more than one tenth in 1965. Figure 12 also indicates that public schools have not been quick to respond to the increasing demands for nursery education, even though they served more three- and four-year-old children over each of the last three decades. In 1989, a very large portion of these

children, about 70 percent, continued to be educated through private schools. In addition, only 40 percent of five-year-old children receive full-day instruction.

Figure 12

Enrollment of 3- and 4-year-old children in pre-primary programs, October 1965 to October 1989

Year	L..rollment (in thousands)	Percent Enrolled of Total Population, 3 and 4 Years Old	Percent Enrolled in Public Nursery Schools	Percent Enrolled in Full-day Programs*
1965	886	10.6%	22.9%	-
1970	1,461	20.5	28.5	12.3%
1980	2,280	36.7	30.9	29.4
1989	2,887	39.0	31.3	40.0

Note: *Kindergarten included
Source: National Center For Education Statistics (1990), Digest of Education Statistics, 1990, U.S. Department of Education.

Since 1965 the federal Head Start program has provided comprehensive services to poor children and their families. Head Start served more than 548,000 children in 1990, about 27 percent of eligible children (Children's Defense Fund, 1991). In late 1990, the Congress authorized a series of funding increases which, if appropriated, would allow all eligible three- and four-year-olds and 30 percent of eligible five-year-olds to participate by 1994. The Head Start appropriation for FY 1991 is $1.95 billion, but could climb to $7.66 billion by 1994 if the authorized level is funded fully. Head Start, however, generally provides only a half day program; Barnett (1985) showed that more long term benefits are derived from full day, full year programs.

In short, fully funding the federal Chapter 1 program for low achieving low income students, P.L. 94-142 for handicapped students, and Head Start would also contribute substantially to all states' ability to accomplish the national education goals for all their students. The extra costs would be just $15 billion.

CONCLUSION

There are substantial fiscal capacity, educational spending, and student outcome differences across the fifty states. These current differences make it difficult for all states to meet the national education goals by the year 2000. Several of the states with the lowest per capita income, have the lowest education per pupil and the lowest level of student outcomes. These states will have a hard time "pulling themselves up by their own bootstraps."

The time may have arrived for a federal role in reducing these interstate disparities. A logical implication of federal goals is some type of nationwide base education spending, adjusted by state and regional cost of education differences, that would allow each district and school to meet the nation's bold and ambitious education goals. This type of new fiscal role may be required because the President and nation's governors are explicit that the goals are for *all* students in all states. Fully funding key federal categorical programs, such

as Head Start, Chapter 1 and P.L. 94-142, also would contribute toward all state's meeting the nation's education goals.

Although such new federal initiatives might be expensive, the federal government is the only government that can intervene to reduce wide interstate disparities. While states and local districts are likely to infuse education with new money during the 1990s (Odden, Chapter 1), they cannot reduce wide interstate differences in fiscal capacity and educational spending. It may be time for a federal role in general education aid, although that aid should be restricted to programs and services likely to improve student achievement relative to the national education goals.

Figure 1

Selected Characteristics of Interstate Disparities in the United States

State	Personal Income Per Capita (1988)	Representative Tax System (RTS) Tax Effort Index (1988)	Expenditures per Average Daily Attendance (1989-90)	Percent of Population completing High School by Age 25 (1980)	Percent of High School Graduating Seniors Taking SAT (1990)	NAEP 8th-Grade Mathematics Exam Score (1990)
Alabama	12,851	84	3,319	56.5	8	252
Alaska	19,079	127	7,252	82.5	42	-
Arizona	14,970	96	3,858	72.4	25	259
Arkansas	12,219	84	3,272	55.5	6	256
California	18,753	94	4,620	73.5	45	256
Colorado	16,463	89	4,878	78.6	28	267
Connecticut	23,[illegible]	90	7,930	70.3	74	270
Delaware	17,661	84	5,848	68.6	58	261
Florida	16,603	82	5,051	66.7	44	255
Georgia	15,260	89	4,456	56.4	57	258
Hawaii	16,753	112	4,504	73.8	52	251
Idaho	12,665	93	3,016	73.7	17	272
Illinois	17,575	102	4,853	66.5	16	260
Indiana	14,924	93	4,126	66.4	54	267
Iowa	14,662	113	4,590	71.5	5	278
Kansas	15,759	104	4,706	73.3	10	-
Kentucky	12,822	88	3,824	53.1	10	256
Louisiana	12,292	90	3,313	57.7	9	246
Maine	15,106	105	5,577	68.7	60	-
Maryland	19,487	108	5,887	67.4	[illegible]	260
Massachusetts	20,816	94	6,740	72.2	72	-
Michigan	16,552	112	5,073	68.0	12	264
Minnesota	16,674	112	4,935	73.1	14	276
Mississippi	11,116	94	3,220	54.8	4	-
Missouri	15,452	86	4,226	63.5	12	-
Montana	12,866	102	4,254	74.4	20	280
Nebraska	14,774	98	3,874	73.4	10	276
Nevada	17,511	69	4,260	75.5	24	-
New Hampshire	19,434	66	4,833	72.3	67	273
New Jersey	21,994	101	8,439	67.4	69	269
New Mexico	12,488	99	4,180	68.9	12	256
New York	19,305	152	8,165	66.3	70	261
North Carolina	14,304	93	4,164	54.8	55	250
North Dakota	12,833	91	3,581	66.4	6	281
Ohio	15,536	97	4,394	67.0	22	264
Oklahoma	13,323	89	3,484	66.0	9	263
Oregon	14,885	99	5,085	75.6	49	271
Pennsylvania	16,233	97	5,728	64.7	64	266
Rhode Island	16,892	104	6,523	61.1	62	260
South Carolina	12,926	96	3,692	53.7	54	-
South Dakota	12,755	95	3,312	67.9	5	-
Tennessee	13,873	83	3,506	56.2	12	-
Texas	14,586	88	4,011	62.6	42	258
Utah	12,193	106	2,733	80.0	5	-
Vermont	15,302	100	5,418	71.0	62	-
Virginia	17,675	91	4,986	62.4	58	264
Washington	16,473	102	4,639	77.6	44	-
West Virginia	11,735	88	4,094	56.0	15	256
Wisconsin	15,524	119	5,763	69.6	11	274
Wyoming	13,609	94	5,391	77.9	13	272

Source: Digest of Education Statistics (1990), National Center for Education Statistics; Significant Features of Fiscal Federalism, Volume 2, (1990), Advisory Commission on Intergovernmental Relations (ACIR); Average SAT Scores by State, 1980, 1985-90 (1990), The College Board; The New York Times (June 7, 1991).

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Figure 2

Descriptive Statistics for Selected Variables of Interstate Disparities

Descriptive Statistics	Personal Income Per Capita (1988)	Representative Tax Effort Index (1988)	Expenditures Per Average Daily Attendance (1989-90)	Percent of Population Completing High School by Age 25 (1980)	Percent of High School Graduating Seniors Taking SAT (1990)	NAEP Eighth-Grade Mathematics Exam Score* (1990)
Maximum	$23,059	152	$8,439	82.5%	74%	281
Minimum	11,116	66	2,733	53.1	4	246
Mean	15,719	98	4,824	67.8	34	264
Standard Deviation	2,910	16	1,399	7.9	24	9
Coefficient of Variation	0.19	0.16	0.29	0.12	0.71	0.04

Note: * 37 states only (Scores not available for Alaska, Kansas, Maine, Massachusetts, Mississippi, Missouri, Nevada, S. Carolina, S. Dakota, Tennessee, Utah, Vermont and Washington)
Sources: National Center for Education Statistics (1991), Digest of Education Statistics 1990, U.S. Department of Education; Advisory Commission on Intergovernmental Relations (ACIR) (1990), Significant Features of Fiscal Federalism, Volume 2; The College Board (1991), Average SAT Scores by State, 1980, 1985-90 (1990); Mullis, Dossey, Owen & Phillips, The State of Mathematics Achievement, Educational Testing Service, 1991.

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Figure 3

Decile Means of Selected Characteristics of Interstate Disparities in the United States, Sorted by Personal Income Per Capita

Decile	Number of States Included in Each Decile	Personal Income Per Capita (1988)	Representative Tax Effort Index (1988)	Expenditures Per Average Daily Attendance (1989-90)	Percent of Population Completing High School by Age 25 (1980)	Percent of High School Graduating Seniors Taking SAT (1990)
1	10	$12,312	93	$3,455	63.4%	8.9%
2	7	13,393	92	3,973	62.8	24.4
3	4	14,727	100	4,390	70.8	26.5
4	7	15,220	98	4,775	66.9	40.1
5	4	15,998	97	4,927	70.9	31.0
6	3	16,543	99	4,921	70.8	33.3
7	7	17,249	96	5,130	68.7	40.6
8	1	18,753	94	4,620	74.0	45.0
9	3	19,273	115	6,750	73.7	59.7
10	4	21,339	98	7,249	69.3	68.5

Sources: Digest of Education Statistics (1990), National Center for Education Statistics; Significant Features of Fiscal Federalism, Volume 2, (1990), Advisory Commission on Intergovernmental Relations (ACIR); Average SAT Scores by State, 1980, 1985-90 (1990), The College Board.

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Figure 4

Correlation Coefficients with Personal Income Per Capita

Expenditure per Average Daily Attendance (1989-90)	Representative Tax Effort Index (1988)	Percent of Population Completing High School by Age 25 (1980)	Percent of High School Graduating Seniors Taking SAT (1990)	NAEP 8th-Grade Mathematics Exam Scores (1990)
.834	.188	.361	.697	.116*

Note: * 37 states only (Scores not available for Alaska, Kansas, Maine, Massachusetts, Mississippi, Missouri, Nevada, S. Carolina, S. Dakota, Tennessee, Utah, Vermont and Washington)

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Figure 5

Regression Results for Determinants of State Educational Expenditures Per Pupil

Variable	Coefficient	T-Value
Per Capita Income	0.23	3.31*
Tax Effort	27.94	3.91*
Percent Poverty	0.43	0.17
Percent Minority	-10.86	1.31
Percent Handicapped	162.04	2.77*
Price Factor	3264.71	1.89*
Percent Parents College Graduates	-9.22	0.45
Intercept	-5861	
R-squared	0.86	

* Statistically Significant at 0.10 level

Figure 6

Decile Means of Selected Characteristics of Interstate Disparities in 37 States* of the United States, Sorted by Personal Income Per Capita

Decile	Number of States Included in Each Decile	Personal Income Per Capita (1988)	Representative Tax Effort Index (1988)	Expenditures Per Average Daily Attendance (1989-90)	Percent of Population Completing High School by Age 25 (1980)	Percent of High School Graduating Seniors Taking SAT (1990)	NAEP 8th-Grade Mathematics Exam Scores (1990)
1	7	$12,436	90	$3,611	61.6%	11%	260
2	5	13,391	92	4,122	65.9	21	263
3	4	14,727	100	4,390	70.8	27	271
4	4	15,170	99	4,551	66.2	37	265
5	3	16,077	94	5,000	70.1	38	266
6	3	16,610	102	5,020	69.3	23	265
7	5	17,311	99	5,343	66.5	49	259
8	1	18,753	94	4,620	73.5	45	256
9	2	19,370	109	6,499	69.0	69	267
10	3	21,513	100	7,419	68.4	57	266

Note: * 37 states only (Scores not available for Alaska, Kansas, Maine, Massachusetts, Mississippi, Missouri, Nevada, S. Carolina, S. Dakota, Tennessee, Utah, Vermont and Washington)
Sources: Digest of Education Statistics (1990), National Center for Education Statistics; Significant Features of Fiscal Federalism, Volume 2, (1990), Advisory Commission on Intergovernmental Relations (ACIR); Average SAT Scores by State, 1980, 1985-90 (1990), The College Board.

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Figure 7

Correlation Coefficients with Expenditure Per Pupil

Personal Income Per Capita (1988)	Representative Tax Effort Index (1988)	Percent of Population Completing High School by Age 25 (1980)	Percent of High School Graduating Seniors Taking SAT (1990)	NAEP 8th-Grade Mathematics Exam Scores (1990)
.834	.458	.274	.681	.175*

Note: * 37 states only (Scores not available for Alaska, Kansas, Maine, Massachusetts, Mississippi, Missouri, Nevada, S. Carolina, S. Dakota, Tennessee, Utah, Vermont and Washington)

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Figure 9

Results of Significance Tests for the Variables Related to NAEP Performance Level in DFA

Predictor Variable	Means of the groups*		Wilks' Lambda	F-scores	p
	High-scoring States	Low-scoring States			
Expenditures Per Pupil	$5,140	$3,985	.807	5.25	.032
Urban Disadvantaged	5.3	11.6	.796	5.64	.027
High Numbers and Operations Emphasis	41.8	53.7	.491	22.81	.000
Teachers with More than 10 Yrs. Exp.	70.7	59.8	.568	16.72	.001
Teachers Taken 4 or More Math Courses	81.6	74.2	.841	4.17	.053
Instructional Time 4 or More Hours Per Week	26.6	41.5	.677	10.51	.004
Small Group Work 1 or More Times Per Week	52.1	43.8	.830	4.51	.045
Testing 1 or More Times Per Week	59.0	75.7	.421	30.24	.000
Reading More Than 5 Pages Per Day	71.3	64.6	.456	26.20	.000
Parents Not Graduated from High School	5.2	11.7	.307	49.65	.000

Note: * The unit of the means of the groups for all variables except expenditures are percent of students.

Figure 10

Discriminant Structure Matrix of Variables Related to State Performance Used in DFA

Variable	Structure Coefficient	Percent of Variance Explained
% Parents not Graduated from High School	-.579	33.5%
Percent Testing more than Once Per Week	-.452	20.4
Reading More than 4 Hours Per Day	.421	17.7
High Numbers and Operations Emphasis	-.392	15.4
Teachers with More than 10 Yrs. Exp.	.336	11.3
Instructional Time Greater than 4 Hours	-.266	7.1
Percent Urban Disadvantaged	-.195	3.8
Expenditures Per Pupil	.188	3.5
Small Group Work More Than Once Per Week	.174	3.0
Teachers Taken More Than 4 Math Courses	.167	2.8

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